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(54) A roll film and a photographic camera for use therewith.

(57) A roll film for a still camera, the film having a leader (14) provided with an aperture (46) that includes a flexible tongue element (50) extending into the aperture (46). The still camera (18) for use with said roll film includes a rotatable film take-up spool (42) having at least one film capturing member (44) mounted thereon. Each capturing member (44) comprises a pin (58) for entering the aperture (46) in the leader (14). Said pin (58) can be formed in a variety of shapes provided that such shape is larger than the film leader aperture (46) when the aperture tongue element (50) is unflexed but smaller than the film leader aperture (46) when the tongue element (50) is flexed. Due to such structure a camera (18) of simple design can be provided, with the roll film being reliably coupled to the camera take-up spool (42) for winding and easily released towards the end of the rewinding operation.

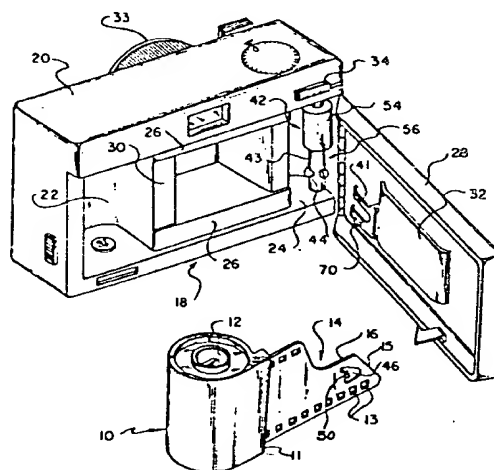


FIG. 1

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A ROLL FILM AND A PHOTOGRAPHIC CAMERA
FOR USE THEREWITH

5 The present invention relates to roll films
and a photographic still cameras for use therewith.
More particularly, the invention relates to improve-
ments in roll films and cooperating camera elements
for automatically coupling the leading end of the film
to a film take-up spool in a still camera.

10 35mm cameras provided with semi-automatic or
automatic film loading devices generally either
frictionally or positively couple the film leader to
a camera take-up spool. Known friction attaching
15 devices do not assure reliable coupling to a take-up
spool. Those that include positive gripping of the
film do not readily release it during rewind.

20 It is the object of the invention to provide
a roll film and a camera of simple design which film
is reliable coupled to the camera take-up spool and
easily released towards the end of the rewinding operation.

25 This object is accomplished by a roll film
having an aperture in its leader and a flexible
tongue extending forwardly (toward the take-up spool)
into the aperture.

30 This film cooperates with a still camera which
has a take-up spool and a film capturing member on
the take-up spool to engage the film leader, the
capturing member having a head surface, a leading
surface and a trailing surface at least a portion of
35 the trailing surface being recessed with respect to
the head surface.

35 When the film is inserted into the camera,
the film leader is delivered either manually or
automatically to a position overlying the take-up
spool. The initial rotation of the take-up spool by
a drive mechanism causes the leading surface of the

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film capturing member to enter the aperture in the film leader, with a portion of the head surface engaging the lower surface of the tongue. Further rotation of the take-up spool first tensions the film, urging the trailing end of the aperture toward the center of the take-up spool and causing the head surface of the capturing member to flex the tongue upwardly out of the plane of the surrounding film leader. Subsequently, the film is moved to a position at which the tongue snaps back to a substantially unflexed position in the recess of the trailing surface of the capturing member to secure the roll film to the take-up spool. On rewind, the process is reversed and the leader is easily released from the take-up core.

According to a preferred embodiment of the invention the leading edge of the aperture is tapered. This cooperates with a film capturing member having a triangular shape to improve the transverse alignment of the film.

The invention and its features and advantages will become more apparent by referring to the accompanying drawings and to the ensuing detailed description of the preferred embodiment.

Fig. 1 is a perspective view of a roll film and of a photographic camera for use therewith according to the invention;

Fig. 2 is a fragmentary exploded view of components of the film securing mechanism;

Figs. 3A, 3B and 3C are, respectively, a plan view, a rear elevational view and a side sectional view of a film capturing member;

Figs. 4A and 4B are plan views of the leading end portion of the roll film the latter also showing a plan view of a film capturing member in a film captured position; and

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Figs. 5A, 5B, and 5C are fragmentary sectional views illustrating the various positions of the film take-up spool and the film leader during the film securing procedure.

5 Because roll films and photographic cameras are well known, the present description will be directed, in particular, to elements forming part of, or cooperating more directly with, apparatus in accordance with the present invention. It is to be understood that film elements and camera elements not specifically shown or described may take various forms well known to those having skill in the art.

10 Fig. 1 of the drawings shows a film cassette 10 in a position for insertion into a camera 18. The cassette 10 contains a roll of film coiled upon a spool 12 and having an elongated film leader 14 extending through a light-tight slot 11. Camera 18 includes a body portion 20 having a film supply chamber 22 and a film take-up chamber 24 arranged on opposite sides of a pair of film guide supports 26, and a camera cover door 28 which is hinged to the camera body 20 in a conventional manner. The guide supports 26 cooperate with a pressure plate 32 mounted on the interior of the camera door 28, to define a film passage way 30 extending between the supply and take-up chambers that maintains the film in a flat, properly oriented position in the focal plane of a camera objective lens 33. Ordinary film support rails (not shown) may also be positioned inwardly from the guide supports 26.

20 In a semi-automatic film loading camera, shown in Figs. 1 and 2, the camera 18 is loaded by (1) inserting the film cassette 10 into the film supply chamber 22, (2) pulling the film leader 14 out of the cassette 10 and positioning it between the guide supports 26 with the leading end 15 of the

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leader overlying the take-up chamber 24, (3) closing the cover door 28 so that the pressure plate 32 and a film guide member 41 bear against the film leader 14, and (4) advancing a film winding lever 34 coupled, via a shaft 36 and a slip clutch 38, to a film take-up spool 42 rotatably mounted in the film take-up chamber 24. The rotation imparted to the take-up spool 42 by the winding lever 34, or by an automatic film transport mechanism described in the succeeding paragraph, enables one of a plurality of film capturing members 44 mounted on the core 43 of the take-up spool to positively secure the film leader 14 to the take-up spool in a manner explained in detail hereinbelow.

In a fully automatic film loading camera (not shown), the camera operator simply inserts the film cassette 10 into the film supply chamber 22 with the film leader 14 lying between the guide supports 26 and closes the cover door 28. In response to closure of the cover door 28, a film transport mechanism is activated to advance the film leader 14 through the passageway 30 and into the film take-up chamber 24.

It is to be understood that the mechanism for transporting the film leader 14 to the film take-up chamber 24 forms no part of the present invention. The foregoing description of particularly useful film transport mechanisms is provided to explain how the present invention cooperates with related camera structure during film loading. However, other manual or automatic film transport mechanisms known in the art could be useful.

Referring now to Figs. 4A and 4B, the film leader 14 is provided with an aperture 46 located near leading end 15. A flexible tongue element 50 extends forwardly, i.e. in the direction of film

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advancement, into the aperture 46, and the leading edge of the aperture is tapered providing the aperture with a lobate configuration. The leading end 15 of the film leader may also be tapered as shown (i.e., forwardly in the direction of film wind) so that it may be readily propelled through the film passageway 30 and into the take-up chamber 24 by an automatic film transport mechanism. A portion 16 of the film leader 14 is laterally trimmed so that its width is less than the width of the remaining major portion 17 of the film roll. As a result the leader portion 16 carries only a single row of sprocket holes 13.

The take-up spool 42 has an annular winding support surface 54 extending radially outward from the core 43 along a portion of the longitudinal core axis. The remaining portion of the core 43 in cooperation with the support surface 54 defines a trough 56 whose width is slightly greater than that of the laterally trimmed portion 16 of the film leader 14. In the trough 56, four film capturing members 44 are mounted at equally spaced intervals about the periphery of the core 43. Each film capturing member 44 consists of an upstanding pin 58 comprising a lower base surface 60, an enlarged, generally triangularly shaped upper, head surface 62, a slanted leading edge surface 64 and a trailing edge surface 66 provided with a recess 68 therein. Advantageously, the maximum radius of the head surface 62 of each of the pins 58 (i.e. from the center of the core 43) is less than the radius of the winding support surface 54, so that the capturing members 44 do not contact the light sensitive portions of the film convolutions wound thereover on the support surface 54.

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The manner in which the film capturing members 44 cooperate with the film leader aperture 46 to secure the film leader 14 to the take-up spool 42 is shown in Figs. 3, 4 and 5.

5 The film leader 14 has a tendency to bend or curl in a clockwise direction as it enters the film take-up chamber 24. This curling action, in cooperation with the film guide member 41, which is pivoted about a shaft 47 mounted on the cover door 28
10 and biased by a spring 48 for clockwise rotation, causes the narrow, leading end portion 16 of the film leader 14 to be directed into the trough portion 56 of the take-up spool 42. The film guide member has a slot 45 in its leading end to allow the film
15 capturing members 44 to pass therethrough during the rotation of the take-up spool 42. The face 55 of the annular winding support surface 54 serves as a film leader edge guide to assure alignment of the aperture 46 with the film capturing members 44
20 emerging from the slot 45.

The rotation imparted to the take-up spool 42 causes the leading edge 64 of one of the pins 58 to enter the film aperture 46 with the tongue element 50 overlying and engaging the head surface 62 as
25 shown in Fig. 5A.

As shown in figs. 4A and 5A the aperture 46 is located at a distance "A" from the leading end 15 of leader 14 which is less than the distance "B" between each of the film capturing members 44. As a
30 result of this relative positioning of the aperture 46 and the film capturing members 44, when one of the film capturing members enters the aperture, the leading end 15 of the leader 14 cannot overlie the preceding capturing member. The triangular shape of
35 head surface 62 and the tapered leading edge of aperture 46 cooperate to laterally align the film.

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In Fig. 3C, the diagonal distance between the leading edge of the lower base surface 60 and the trailing edge of upper head surface 62 is denoted "Z". As best shown in Fig. 4B, when the tongue element 50 is unflexed, the lobate aperture 46 is smaller than the head surface 62 of the pin 58. That is to say, when the tongue element 50 is unflexed, the distance between the leading edge 72 of the film aperture 46 and the tongue element 50 (denoted "X" in Fig. 4A and 4B) is less than the distance "Z". As a result, the head surface 62 cannot pass through the aperture 46.

Fig. 5B shows that further rotation of the take-up spool 42 causes the film guide member 41 to slide the leading end 15 of the film leader 14 downwardly along the leading edge surface 64 of the pin 58 and into engagement with the core 43. The downward movement of the leading end 15 causes the trailing end of the aperture to be urged toward the base surface 60 so that the head surface 62 flexes the tongue element 50 upwardly out of the surrounding film plane along a flexing region 78 that is transverse to the direction of film advancement. When the tongue element 50 is flexed, the aperture 46 is larger than the head surface 62 of the pin 58. That is to say, when the tongue element 50 is flexed, the distance between the leading edge 72 of the aperture 46 and the tongue element 50 (denoted "X" in Fig. 4A) is greater than the distance "Z". The head surface 62 can now pass through the aperture 46.

Continued further rotation of the take-up spool 42 (shown in Fig. 5C) allows the tongue element 50 to snap back to a substantially unflexed, capturing position in the recess 68 provided in the trailing edge surface 66 of the pin 58. This snap action securely locks the film to the take-up spool

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42 so that the tongue element 50 must again be flexed to permit disengagement of the film from the capturing member 44. The film guide member 41 is also provided with a protuberance 70 located rearwardly of the slot 45 that rides upon the row of perforations 13 in the narrow portion 16 of the leader 14. The protuberance 70 thus acts to lift the guide member 41, after the attachment of the film leader 14, away from the film to avoid scratching the light sensitive portions of the film.

During the rewinding of an exposed roll of film back into the supply chamber 22 by means (not shown), the film leader 14 is pulled to a position that again is approximately tangential to the core 43 of the take-up spool 42. This causes the tongue element 50 to flex downwardly (the opposite direction from its flexing in the film connecting procedure) thereby allowing the head surface 62 to again pass through the aperture 46 and the film leader 14 to disengage from the capturing member 44.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention. For example, the head surface of the film capturing member can be formed into a variety of shapes (oval, egg shaped, etc.) provided that such shape is larger than the film leader aperture when the aperture tongue element is unflexed but smaller than the film leader aperture when the aperture tongue element is flexed.

CLAIMS:

1. Roll film for a still camera, the film being characterized by a leader (14) provided with an aperture (46) adapted to be entered by a capturing member of a rotatable film take-up spool to which the leader (14) is delivered, said film including a flexible tongue element (50) extending forwardly into the aperture (46).

0 2. A roll film according to Claim 1 wherein the leading edge (72) of said aperture (46) is tapered.

5 3. A photographic still camera for use with roll film of the type claimed in claim 1 or 2, the camera (18) including a rotatable film take-up spool (42) and characterized by at least one film capturing member (44) mounted on the take-up spool (42) and adapted to engage the film leader, each film capturing member (44) comprising a pin (58) for entering the aperture in the leader, the pin (58) including a head surface (62), a leading edge surface (64) and a trailing edge surface (66), at least a portion of the trailing edge surface (66) being recessed relative to the head surface (62).

20

25

4. A photographic still camera according to Claim 3 wherein the leading edge surface (64) of the film capturing member (44) is slanted forwardly in the direction of film wind outwardly from the take-up spool (42).

30

5. A photographic still camera according to Claim 3 or 4 and particularly adapted for use with roll film according to claim 2 wherein the head surface (62) of the film capturing member (44) is generally triangular.

35

6. A photographic still camera according to Claim 3 to 5 wherein the take-up spool (42) has at least one annular winding support surface (54) and a portion of a core (43) bearing the film capturing member (44) on its periphery, the combined radius of the core portion and the film capturing member (44) being less than the radius of the annular winding support surface (54).

7. A photographic still camera according to claim 6, said camera having a film guide member (41) which is biased towards the film take-up spool (42) and adapted to guide a film leader (14) into engagement with a film capturing member (44), characterized in that the film guide member (41) comprises an elongate slot (45), which allows the film capturing member (44) to pass therethrough during the rotation of the take-up spool (42) when said film guide member (41) is in a first position engaging the surface of core (43), and a protuberance (70) aligned with a marginal portion of the roll film, which protuberance (70), when engaged by said marginal portion, causes the film guide member (41) to be disengaged from the core (43) and the non-marginal area of the roll film.

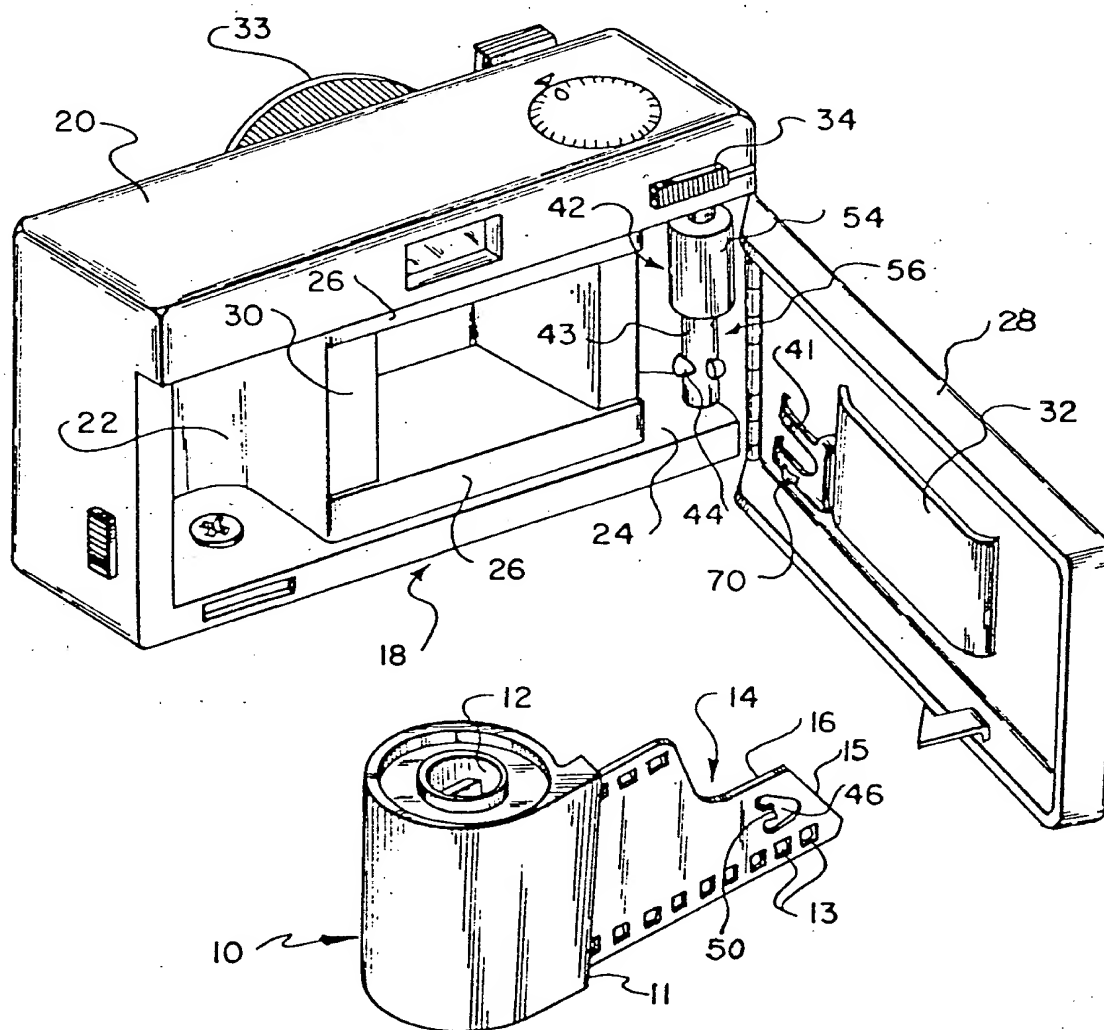


FIG. 1

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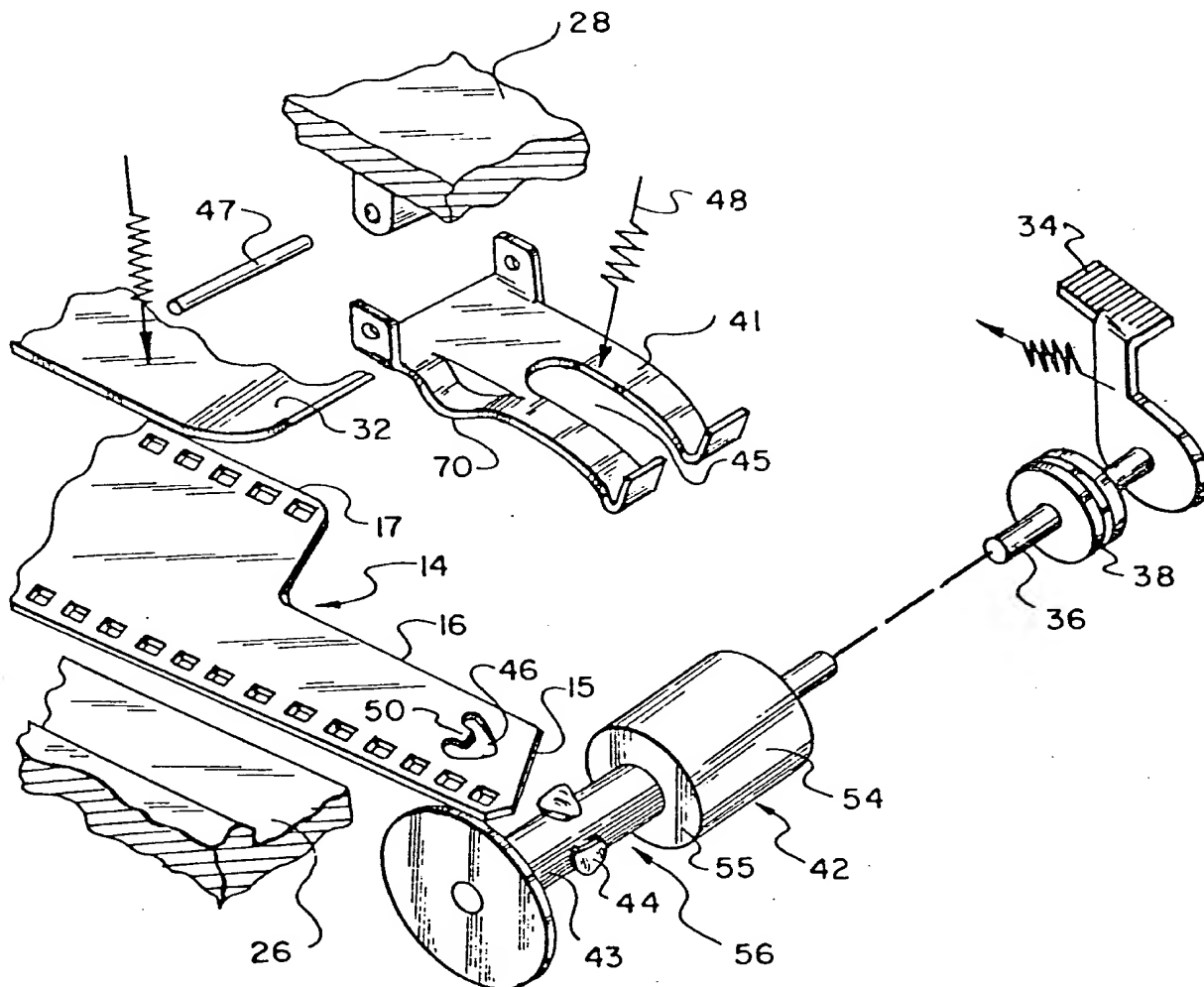


FIG. 2

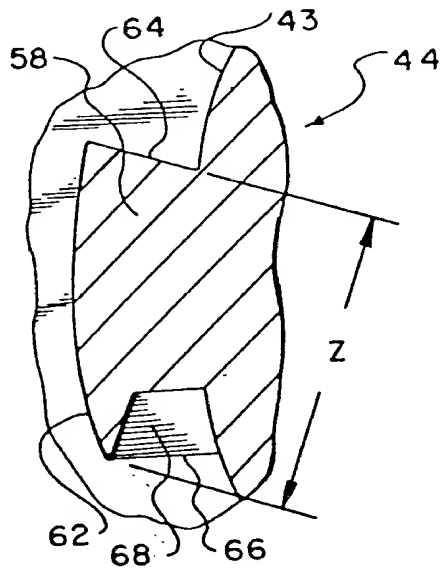


FIG. 3C

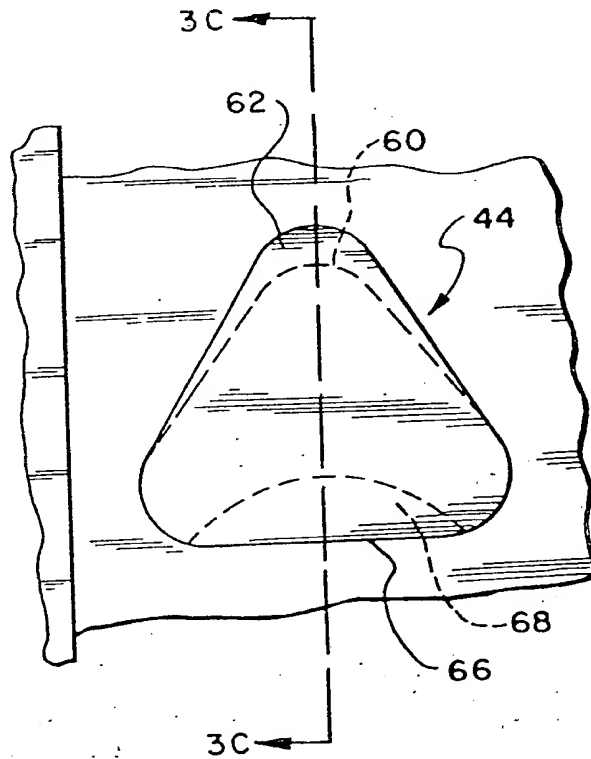


FIG. 3A

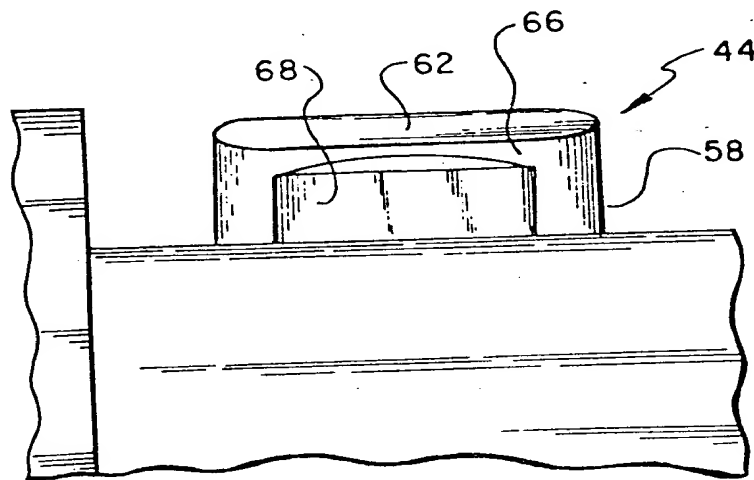


FIG. 3B

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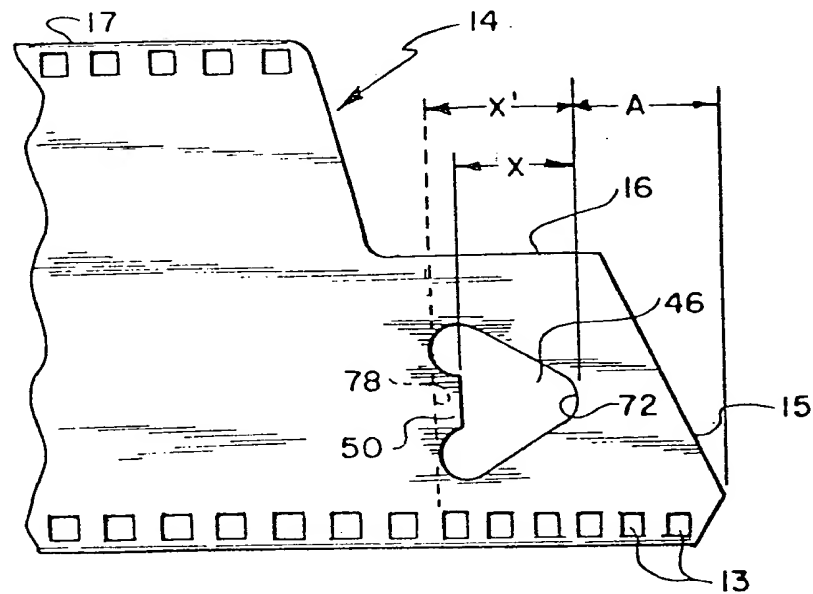


FIG. 4A

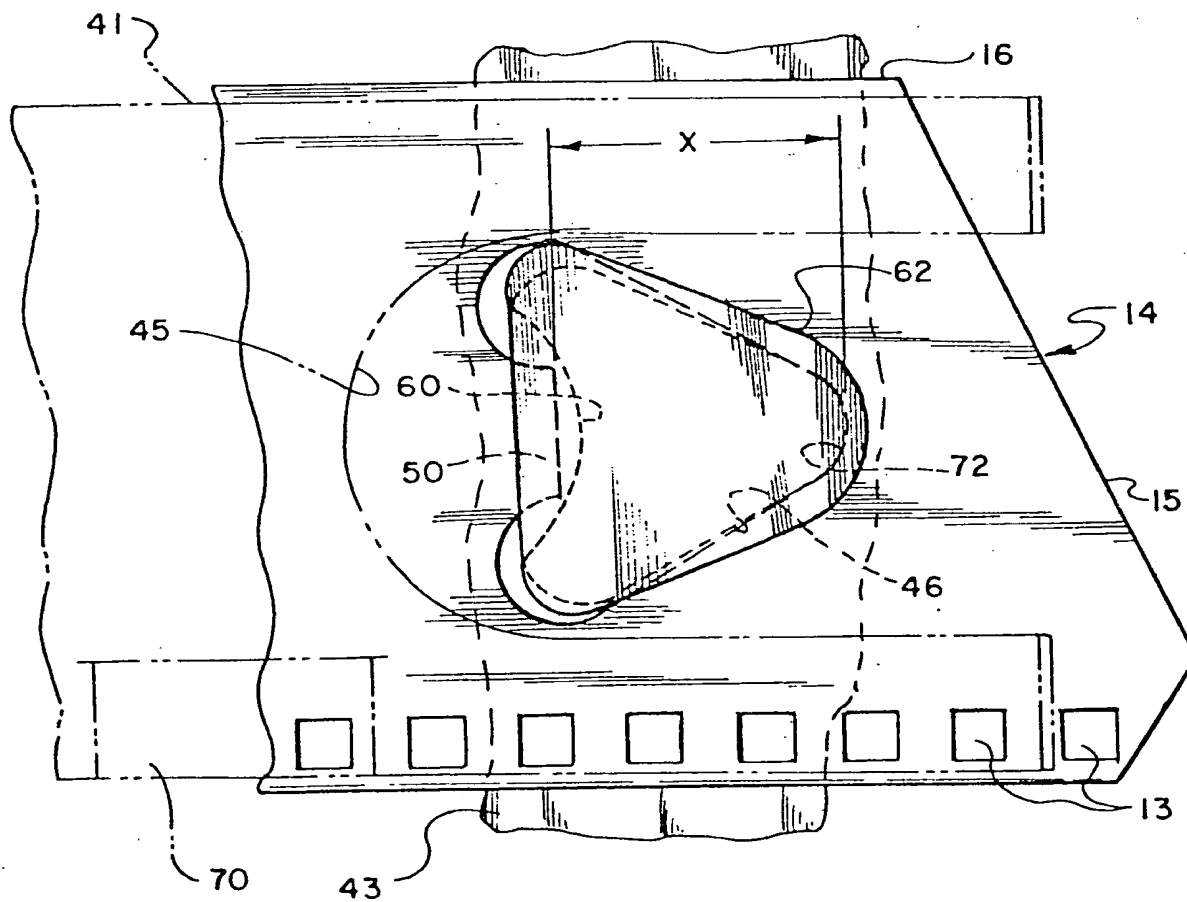


FIG. 4B

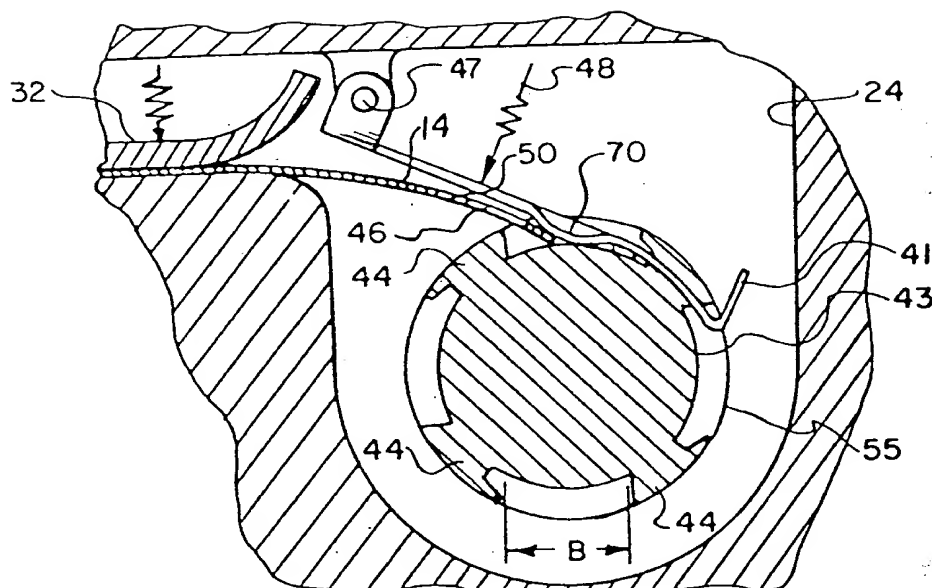


FIG. 5A

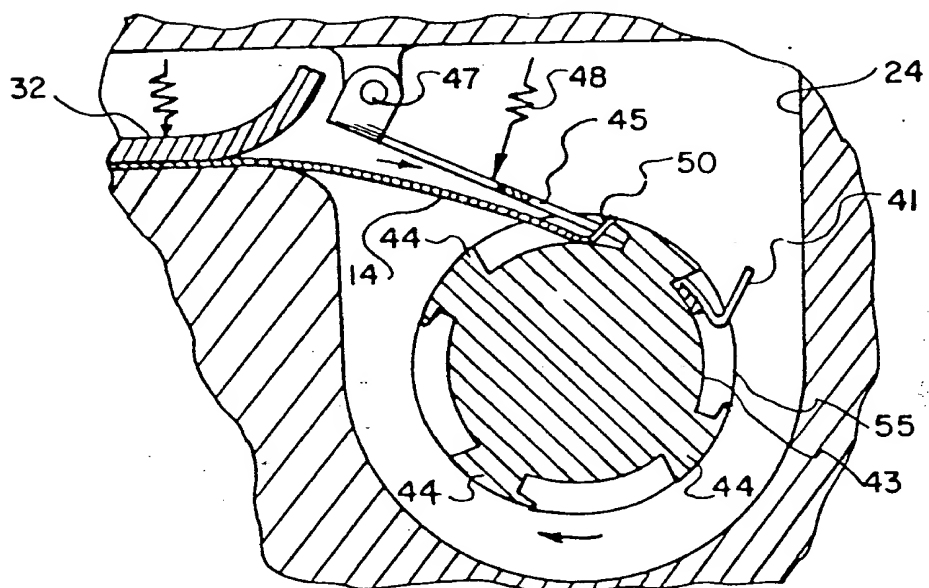


FIG. 5B

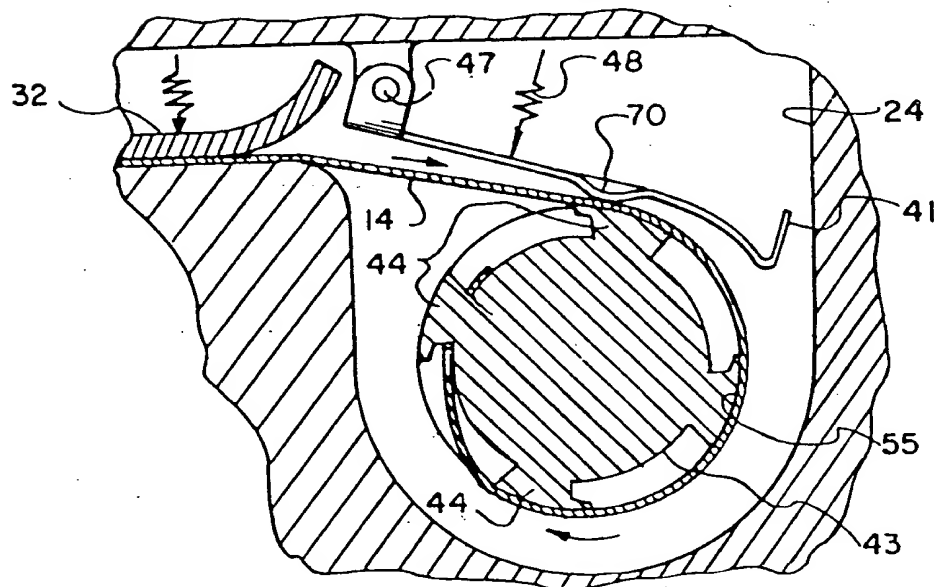


FIG. 5C



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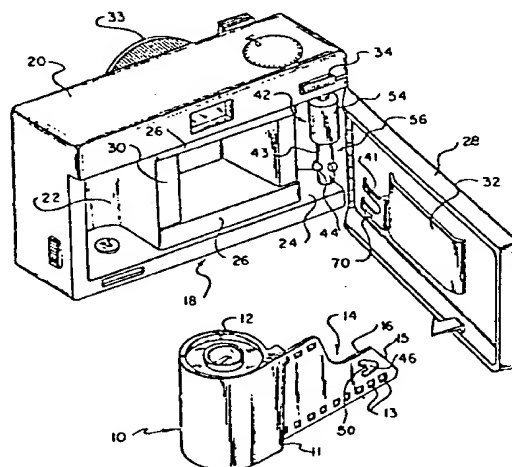


FIG. 1